Joint E3 Bulletin

JOINT E3 BULLETIN

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In This Issue:

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2000 DoD E3 Program Review Another Successful Meeting!!

The annual DoD E3 Program Review was held 11-13 April at the Omni-Rosen Hotel in Orlando, Florida. Over 200 representatives from the Government and Industry met to exchange technical information on E3 and Spectrum Management. In addition, the National Interagency Coordination Group (NICG) conducted their biannual Lightning Conference in conjunction with the DoD Program Review, as did the Naval Air Systems Command (NAVAIR) who conducted their E3 Program review.

Monday 10 April was dedicated to the Services. Each service conducted a meeting on E3/Spectrum Management issues. For example, approximately 110 people attended the meeting, representing Navy Headquarters, laboratories, and their contractors. CAPTAIN Adams from COMSECFLT provided an overview of E3 concerns and issues being experienced by the Navy Warfighter over the past year. Mr. Ed Fabney, from OPNAV N61, presented the prestigious Dr. Robert Haislmaier award to Mr. Benjamin Franklin III, of NSWCDD. Following this award, presenters from Fleet, OPNAV, NAVAIR, SPAWAR, and NAVSEA reported on the current status of their organizations and pertinent E3 efforts performed since the last review.

During the afternoon, members of the E3/SM community from the Navy provided technically oriented presentations which summarized activity conducted over the past year.

On Tuesday, 11 April Mr. William Lenzi of the Joint Spectrum Center, (JSC) opened the 2000 DoD E3 Program Review with a Welcome Address. Following this address, esteemed representatives from the Office of the Assistant Secretary of Defense (OASD[C3I]), Joint Chiefs of Staff (JCS), OSD OT&E, Office of Spectrum Analysis and Management (OSAM), and the JSC provided updates regarding their activities in support of E3/SM initiatives over the past year. Specifically, Mr. Russ Latimer provided the E3 perspective of the Office of the Assistant Secretary of Defense (OASD[C3I]), CAPT. C. Mitchell provided a perspective of the Joint Staff, Mr. L. Golliday of IDA provided the status of the new OT&E E3 Policy Memorandum, Ms. R. Cowen-Hirsch provided the status of activities at OSAM, and Col J. Yavorsky, Commander of the JSC, and Mr. Lenzi summarized activities at the JSC.

Mr. Lenzi introduced the Keynote Speaker, RADM T. W. Steffens, USN, Director of the Intelligence and Information Operations Center, United States Special Operations Command, MacDill Air Force Base, Florida. The Admiral gave a vibrant, interesting, and energizing message regarding the relationship of the needs of the warfighter and activities in our community to identify and resolve E3/SM issues and concerns that compromise our warfighters ability to accomplish their missions.

During the afternoon sessions, the Army, Navy, Air Force, NASA, and DTRA provided their E3 perspectives of activities accomplished over the past year, and Service representatives from the SM community described their activities. That evening, all were treated to a no-host social dinner, and a entertaining magic show.

On Wednesday, 12 April, both the morning session of the DoD review and the NICG Lightning Conference were held in concert with each other. Every effort was made to minimize any conflict between the two events.

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(*2000 DoD E3 Program Review continued from page 1*)

During the DoD review, technical presentations on Tools and Techniques, International E3 activities, and E3 Standards were conducted. The Tools and Techniques session topics included SPECTRUM XXI, Occupied Bandwidth Calculations, EM Modeling Codes, Automated Parameter Estimation Techniques (PET), and Predicting EMI Rejection Requirements for Complex Systems.

The mid-morning session on International E3 Activities included presentations by representatives from the Netherlands, Canada, and Israel. During the afternoon, a training course on "Accidents, and Near Accidents in the Military and Industry due to Electrostatic Discharge (ESD) through Explosives, Electro-Explosive Devices and Pyrotechnics" was given by Moshe Netzer of Israel.

On Thursday, 13 April, sessions consisted of technical material which fell into one of three categories: Radiation Hazards, E3 Issues and Studies, Testing. The FAA, AeroSpatiale of France and NSWCDD representatives provided unique presentations related to Radiation Hazards.

The last event of the week was a training course on Friday, 14 April, titled "DTRA EMP Tutorial", provided by Walter Scott. It was well received by all attendees.

In summary, the conference went off very smoothly with a minimum of problems. The proceedings in the form of a CD-ROM will be distributed to participants in the June/July time frame.

Joseph Juras Retires from Civil Service

Mr. Joseph Juras, who was the Director for Battle Force Electromagnetic Environmental Effects (E3) Interoperability in the Warfare Mission Directorate in the Naval Sea Systems Command, SEA 53, retired after 30 years of government service. As Director of the BattleForce E3 Interoperability, he was responsible for the analysis, identification, and resolution of E3 issues during ship/submarine and equipment design. Mr. Juras was also responsible for shipboard testing to identify and resolve E3 problems during ship/submarine construction and modernization. He provided support to the establishment of the Shipboard Electromagnetic Compatibility Improvement Program (SEMCIP) which provides direct EMC support to the fleet. The knowledge gained from the fleet support program is fed back to the design community to minimize the recurrence of E3 problems in subsequent design phases.

Mr. Juras held various positions of increasing responsibility within the Combat Systems Engineering Group. During his tenure with NAVSEA, he served as the Branch Head of the Topside Design Branch and Equipment Electromagnetic Compatibility (EMC) Branch and as the Director of the EMC Division. He also served as the lead topside engineer for the CG 47 class, the E3 and topside engineer for the DDG51 class, and the EMC test and evaluation engineer for the AOE 6 class. Mr. Juras was the US Navy alternate delegate to the NATO Naval Armaments Group, Special Working Group (SWG/10) for martime E3. He frequently provided consulting services on E3 issues to program managers, other military services and government agencies, as well as foreign governments.

Mr. Juras received a B.S. degree in Electrical Engineering from the University of Maryland. He is married to the former Rosalie Fincham of Baltimore, Maryland.

SAE LIGHTNING COMMITTEE ISSUES THREE DOCUMENTS

The SAE AE-2 Lightning Committee recently released three new recommended practices:

- ARP 5412, "Aircraft Lightning Environment and Related Test Waveforms," which consists of the most current lightning data and analysis available as well as test waveforms, based on current Industry practice, used to show compliance with various lightning regulations applied to aircraft and associated systems.
- ARP 5413, "Certification of Aircraft Electrical/Electronic Systems for the Indirect Effects of Lightning," which consists of guidelines for showing compliance with regulations for hazards caused by the lightning environment to new or modified electrical/electronic systems or equipment installed either on or within new and modified aircraft.
- ARP 5414, "Aircraft Lightning Zoning," which includes the most current guidelines on defining lightning strike zones on aircraft along with descriptions of the various zones and examples of various zone locations.

All three documents were developed in conjunction with the EUROCAE WG-31 Lightning Subcommittee and are to be used by anyone attempting to certify aircraft or aircraft systems to the current U.S. and European lightning requirements. To order any of these documents, contact SAE at 724-776-4970 or e-mail: publications@sae.org.

E3 Personality of the Quarter

Major David Pierce is assigned to the Air Force Frequency Management Agency in the Engineering Division. He is the Air Force representative to the DoD E3 Integrated Product Team, chaired by the Joint Spectrum Center. He has a Master of Science in Systems Management from the University of Southern California. Major Pierce brings diverse experience to the E3 arena. Most of his assignments have been with operational Air Force (AF) commands.

Major David Pierce

He began his career as Communications Watch Officer in the 15th AF Command Center, Strategic Air Command. After a year he moved into Radio Operations; he trained aircrews in radio usage and planned command and control procedures in a nuclear environment. He led a quick response deployable team that established High Frequency Command and Control (C2) links during contingencies.

Two tours in Europe acquainted Maj Pierce with C2 in overseas contingencies. During his first stour of duty, he oversaw communications operations for a Tactical Reconnaissance Wing, scoring excellent ratings during Operational Readiness Inspections and NATO Evaluations.

From Germany, he transferred to Colorado Springs, Colorado, for two tours with Air Force Space Command. His first position was Chief of Plans for Communications in Cheyenne Mountain, site of the NORAD Command Center. While there, he directed radio communications support for CINCNORAD. After two and a half years at the mountain, he transferred to HQ AFSPACECOM where he planned the integration of C2 systems into Cheyenne Mountain.

His second tour in Germany brought him to Headquarters US Air Forces Europe where he supervised staff support to unit drawdown actions and organizational realignments, ensuring that saved communications and information manpower billets were retained for expeditionary contingency operations that are the norm in today's European theater.

From Europe, Maj Pierce was assigned to Headquarters at HQ USCINCPAC, Camp Smith, Hawaii. He worked on assessments of resource sufficiency for Pacific Theater joint C2 systems. He was the focal point for HQ USCINCPAC's role in Joint Technical Architecture development, J6 participation in Advanced Concept Technology Demonstrations, and Joint Warfighting Interoperability Demonstrations.

In August, 1999 he assumed his present duties as Chief of Technical Evaluation and Certification for the Air Force Frequency Management Agency, Alexandria, Virginia. He is married with no children.

Draft DoD/Industry Study on Use of Commercial Standards Released

A final draft of the Defense/Industry E3 Standards Committee (DIESC) Engineering Practices Study (EPS) has been distributed in accordance with the guidelines of DoD 4120.3-M, "Defense Standardization Manual," Chapter III, and SD-1, "Standardization Directory." The DIESC work has been reported in previous issues of this bulletin. The study represents a cooperative effort between DoD and US Industry with a primary goal of assessing the suitability of using equipment qualified to commercial electromagnetic compatibility (EMC) standards for use in military applications. This goal is consistent with the guidance provided by SD-2, "Buying Commercial and Non developmental Items: A Handbook." MIL-STD-461E was used as a basis for comparison. The EPS is intended to assist government acquisition personnel when selecting commercial equipment. A secondary goal of the DIESC was to harmonize national and international commercial standards with MIL-STD-461, where possible.

Comments may be forwarded to the following by 30 June 2000:

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Other Points of Contact for additional information are:
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Dr. Ralph Showers
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E-mail: showers@pender.ee.upenn.edu

The study may be obtained by contacting:
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ASC/ENSI
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Wright-Patterson AFB, OH 45433-7101
Phone: (937) 255-1652
E-mail: pamela.scott@wpafb.af.mil

SPECTRUM XXI: SPECTRUM MANAGEMENT FOR THE 21ST CENTURY

(*Article provided by Dan O'Neill, JSC/J6***)**

In October 1999, the Joint Spectrum Center (JSC) and its Engineering Support Services Contractor, the IIT Research Institute, began initial fielding of SPECTRUM XXI. With this auspicious beginning, the Joint Staff's vision of a single DoD spectrum management information system became a reality.

Version 1 of SPECTRUM XXI combines the functionality of the Joint Spectrum Management System for Windows ($JSMS_w$), Version 3.01, with the functionality of the Distributed Computer Facility software, Version 12.1. In addition, SPECTRUM XXI provides a robust, modern client-server architecture that supports DoD spectrum management operations worldwide. The SPECTRUM XXI architecture is depicted in Figure 1.

Figure 1. SPECTRUM XXI Client-Server Architecture.

The server architecture includes a Central Server and three Regional Servers. The Central Server, which is located at the JSC, is the main repository of frequency assignment data for the DoD. It is used to exchange frequency assignment proposals, addressed to the National Telecommunications and Information Administration (NTIA), with the existing Frequency Resource Record System (FRRS) Central Computer Facility. The Central Server receives update status on frequency assignment actions from the NTIA involving both DoD assignments within the United States and possessions and other federal agencies. This repository includes permanent frequency assignments from data sources such as FRRS and NTIA's Government Master File (GMF). The Central Server automatically exchanges data with the Regional Servers, via the Secret Internet Protocol Network (SIPRNET), as updates are posted on either platform.

The Regional Servers, which are located in CONUS, Europe, and Hawaii, provide frequency proposal processing and updates to all spectrum management users within a geographic region. This data includes the frequency proposal and frequency proposal status, FRRS frequency assignments, and GMF background frequency assignments. The Regional Servers are mirror sites of each other and the Central Server; therefore, SPECTRUM XXI clients can use the server that is most accessible from their location.

The SPECTRUM XXI client software runs on a standard IBM compatible PC under Microsoft Windows NT. All of the spectrum management application software (e.g., frequency proposal editor, frequency nomination, interference analysis, etc.) is resident on the client computer. Moreover, the client also has its own local database, which has been implemented using Visual FoxPro. Hence, the SPECTRUM XXI users can conduct much of their work in a stand-alone mode (i.e., not connected to the servers). When a user needs to initiate a data transaction (e.g., transmit a data proposal, get an update on frequency assignments within his/her area of operation, etc.), the user will then connect to a server either via SIPRNET, a Secure Telephone Unit-III (STU-III), or a Secure Terminal Equipment (STE) device and conduct a data exchange.

The JSC is currently conducting SPECTRUM XXI user training. The classes, which run for 9 days, cover the basics of system operation, data exchange, the various engineering tools, and using SPECTRUM XXI in a tactical environment. The classes are held monthly at the JSC in Annapolis, MD. More information on the training schedule and how to request training can be found on the SPECTRUM XXI home page. This page can be reached at http://www.jsc.mil. The link to the home page is found on the pull-down menu under Items of Special Interest. Additional information on SPECTRUM XXI can also be found on the SPECTRUM XXI home page or by contacting Skip Shealy by telephone at 410-293-4956 or DSN 281-4956, or by email at shealyw@jsc.mil.

Wiring The Battlefield With Wireless

(*Article provided by D. Bassett/ARL*)

On September 30th, the Army is scheduled to complete the first step in a process that will transform the Army – the establishment of the First Digitized Division. This initial phase of converting the 4th Infantry Division will be the culmination of several years of effort to apply "Information Age" technologies to all aspects and functions of the operation of Army units. The changes that are underway will stretch from the individual soldier, through companies, battalions, and brigades, to divisions, corps and echelons above corps. These changes will affect all battlefield functional areas and will allow the Army to transform itself from the forward deployed force with a very focused mission, which was the strategy during the Cold War, into a CONUS-based force with a flexible engagement strategy.

Traditional methods of battlefield operations will disappear. Paper maps will be replaced with workstations, laptop computers, and handheld devices that will display digital terrain maps. Land navigation by compass will be replaced with the precision of the Global Positioning System. Operation plans and orders will be generated on workstations and distributed via e-mail to commanders at all levels. Intelligence will be collected, processed, and turned into required products in minutes and hours, instead of days. Unit commanders will receive operational briefings via video teleconferencing instead of face-to-face meetings. Commanders will view the battle on computer driven display screens, which will show the movement of friendly as well as enemy units superimposed on digital terrain maps. Real-time video will be available from unmanned aerial platforms to enhance visualization of the battlespace. Commanders at all levels will have the ability to extract real-time data form databases on enemy order of battle, weather, terrain analysis, ammunition expenditure, fuel consumption, causalities, and repair parts resupply status.

The 21st Century Army must be able to execute operations from the low end of the spectrum such as promoting regional stability and conducting peacetime operations to fighting and winning major theater wars at the high end of the spectrum. The transformed Army will not only be capabilities based but also information based, and Force XXI is the process that will lead to Army XXI–a digitized and networked force with information dominance that provides the basis for full- spectrum threat dominance.

Digitization

One of the key underpinnings of the Army XXI vision is that the Army must be interoperable, in its broadest sense, on the battlefield from the front line to the highest headquarters. The Army must be able to interact at anytime to convey ideas, orders, and plans throughout the battlefield, from the individual soldier–to the maneuver unit level–to the task force level and ultimately–to the theater command level. To achieve this vision, the Army began an initiative several years ago called Digitization.

Digitization applies information technologies to acquire, exchange, and employ digital information throughout the battlespace, tailored to the needs of each commander, shooter, and supporter. This information will enable each commander to maintain a clear and accurate vision of his battlespace to support both planning and execution and will produce increased lethality, enhanced survivability, higher OPTEMO, and longer sustainability. Digitization will provide the warfighter a decisive edge through information dominance.

Tactical Internet & Situational Awareness

The backbone of digitization will be a secure, robust, mobile, wireless communications network that provides connectivity from the smallest elements (the soldier) to the highest deployed echelons and connectivity back to the sustaining base. This network will become the conduit for the distribution of all information. It is the vital link that will enable soldiers, weapon platforms, and units to act in concert and enable their commanders to see and understand the battle as it unfolds. The forward element of this network is called the Tactical Internet (TI) and is based on terrestrial VHF and UHF radios as well as SATCOM communications and requires two commodities that are becoming increasingly in shorter supply – SPECTRUM and BANDWIDTH!

One of the revolutionary new concepts of digitization is called Situational Awareness (SA). Answering the following three questions have always been a major problem for the Army: Where is the enemy? Where are my buddies? And where am I? In fact, approximately 80 % of tactical voice communications traffic relate to these questions. In the Digitized Army, these questions will be answered by The All Source Analysis System (ASAS), the Maneuver Control System (MCS) and the Force XXI Brigade and Below (FBCB2) system . The TI will allow these questions to be answered in near real time and will allow this information to share with other individuals, units, and headquarters to provide unprecedented battlefield visualization.

Combing this enhanced battlefield visualization with a collaborative planning process will result in what is called a relevant common picture of the battlespace which can be shared by all echelons, across all battlefield functional areas. This common picture is what is most useful as it enables battalion and brigade commanders and their staffs as well as the division commander and his staff to come together and see the same thing at the same time.

At the tactical level, the FBCB2 system will provide the soldier and each platform the basic SA information required. This system will display friendly and enemy unit locations superimposed on a digital terrain map, and operation overlays will be transmitted and displayed on each maneuver unit platform. This

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(*Wiring the Battlefield continued from page 5*)

system comes in two versions, an Applique and an Embedded Battle Command version. Both versions perform the same function and both are connected to the Tactical Internet via either the Single Channel Ground & Airborne Radio System (SINCGARS) or Enhanced Position Locating Reporting System (EPLRS) radios. The planned procurement for FBCB2 is approximately 60,000 – that's one for every 8 1/2 soldiers in the Active Force! It's been estimated that in some battalion size units there may be 300-400 of these units. And all will be connected to a radio to transmit and receive data.

Antennas and more antennas

Many of the digitized platforms will have as many as a dozen antennas mounted on a single vehicle. Although having multiple transmit and receive antennas on a single platform is not unusual for aircraft or ships, it is unusual for most tactical ground systems, and the Army has been working, sometimes successfully and sometimes unsuccessfully, to avoid co-site interference and self jamming problems. The recently cancelled Command and Control Vehicle is a good example of this type of system. This system contained 6frequency-hopping SINCGARS VHF radios, an EPLRS UHF radio, a Mobile Subscriber receiver/transmitter, a GPS receiver, and two tactical satellite terminals – all working simultaneously and harmoniously together– at least that was the requirement .

Digitization encompasses many echelons, and at each echelon the Army is building digital information fusion centers called Tactical Operations Centers (TOCs). The Army has had TOCs before, but the major challenge has been to evolve from early experimental versions of these capabilities to an integrated, network-centric architecture that spans a wide variety of weapon platforms and meets the requirements–and constraints–of the various operational environments. TOCs present a considerable E3 challenge due to the close proximity of the vehicles and the number of transmitters and receivers. For example, a brigade TOC consisting of a dozen vehicles may have as many as 50-60 transmitters and receivers.

Digital Soldiers & the advance of technology

The Army is wiring the individual soldier with a system called Land Warrior. This system will provide the dismounted soldier with many of the same capabilities as the weapon platforms. The E3 challenge here is preventing EMI with relatively short separation distances between sensitive electronics and the radio antennas. Tactical operations increasingly demand longer ranges which means higher transmit power, and of course anything that adds even ounces of weight, such as metal shielding, is not viewed favorably.

The Army also has other challenges related to the use of non-shielding composite materials digital electronics that operate at lower and lower voltages and currents increased sophistication of electronics control and increased use of automated decision making and system operation.

Management Challenges

The Army, like the other Services, must deal with all those management initiatives that seem to get in the way. Regardless of our yearning for the "good old days" when we could carefully control designs, could spend years in development, had lots of time and money for testing, and the military drove the industry, we must accept the fact that the acquisition world has changed. And nowhere is this changingmore evident than in the world of information technology. The Army is buying many of the same hardware items that we have in our homes or offices. Additionally, the lifetime of IT hardware seems to be measured in months and certainly not years, so PMs are under pressure to field a capability before it is rendered obsolete and not supportable by the advance of technology.

PMs and the T&E community are under pressure to use more modeling and simulation instead of testing as a means to save time and money. There certainly is a place for modeling and simulation in E3 but not as a replacement for testing. The two must complement each other and work together to enhance understanding and reduce risk.

The Army is also digitizing many platform types at the same time that puts a strain on our E3 subject matter experts to provide the level of support necessary to develop a good product. And finally, the PM must be convinced that the E3 community brings value-added to the program, which may at times be a hard sell.

Information is the key

The Force XXI process is building a battle command system that is deployable, flexible, interoperable and responsive to the battle commander across the full range of force projection activities. This process recognizes the commander's need for information such as real-time situational awareness, a common picture of the battlefield, broadcast intelligence, real-time databases, as well as on-the-move C2 capability, and interoperability with multiple military and commercial communications and automation gateways.

The success of Digitization and the Army XXI vision depends on the ability to transmit this information across a robust, survivable and electromagnetically and spectrum compatible mobile communications network. The nature of the technology will force the Army to continuously integrate new commercial products, design new communications architectures, and to interface with new systems. We in the E3 community must assist in the design and configuration of platforms to accommodate these technology changes and to do this while minimizing the need to perform complete retesting when these changes occur.

EMC Challenges at the 2000 IEEE International EMC Symposium

The IEEE EMC Symposium will be held during the week of August 21-25, 2000 in Washington, DC, at the Washington Hilton and Towers Hotel.

As part of the symposium, presentations on a number of EMC Challenges in the 21st Century will be given. These include:

Tuesday Morning
"EMC Challenges" – Providing Spectrum for Use by the Private Sector
Chairperson – Julius Knapp – Federal Communications Commission

- Meeting the Spectrum Needs for New Satellite Services
- Providing Spectrum for Third Generation Mobile Services
- Spectrum Requirements for Fixed Services
- The New Spectrum Management Paradigam – Auctions and Flexibility
- Government/Non-Government Spectrum Sharing
- Impact of New Technologies in Spectrum Management

Tuesday Afternoon
"EMC Challenges" – Providing Spectrum for Use by the Federal Government
Chairperson – TBD

- A Wireless World and New Spectrum Dependent Technology
- Federal Government Requirements for Spectrum
- How NTIA Will Meet the Challenges
- Optimum Utilization of the Spectrum – Spectrum Sharing
- Spread Spectrum Systems
- DSP and Error Detection and Correction Coding

Wednesday Morning
"EMC Challenges" – Providing E3 and Spectrum Support to the Warfighter
Chairpersons – Bill Lenzi and Steve Caine – Joint Spectrum Center

- The Warfighter's Requirements for Spectrum
- JSC Functions and Responsibilities
- Incorporating E3/SC in Acquisitions
- Utilization of Ordnance in Future Joint Operations
- Standardizing Spectrum Information Systems
- Sitting Mobile Service Providers on DOD Property

Wednesday Afternoon
"EMC Challenges" – Dealing with EMI Problems in the Transportation Industry
Chairperson – Andy Drozd – Andro Consulting Services

- Intelligent Transportation Systems and Potential EMC Concerns
- Transient Protection of Transportation Equipment
- Aircraft Protection Requirements for High Intensity Radiated Fields
- Measurement Methods and Application of EMC Regulatory Limits to Government and Commercial Transportation Systems
- Spread Spectrum Communications and Control Systems in Modern Transportation and Traffic Control Applications
- Practical Techniques to Minimize EMI in Commercial Vehicles
- Space Transportation Systems Spectral – Orbital Congestion

Thursday Morning
"EMC Challenges" – Using COTS Equipment for Military/Critical Applications
Chairperson – Dave Dixon – Naval Undersea Warfare Center

- The Guides EMC Specification/ Platform Requirement Matrix and Some Navy COTS Issues
- Harmonization of Military and Commercial EMC Specifications
- The Difficulty in Comparing Military and Commercial EMC Standards
- Proliferation of EMC Standards
- A Comparison of Commercial and Military High Level EM Susceptibility Requirements

Thursday Afternoon
"EMC Challenges" – Impact of EMC Metrology on Specifications and Standards
Chairperson – Dr. Motohisa Kanda – National Institute of Standards and Technology

- EM Shielding Measurement Methods and Techniques
- Application of EMC Measurement Methods and Techniques to Cables
- EMC Measurement Methods and Techniques for PCBs
- EMC Measurement Methodology for Lightning and ESD
- Radiation Hazard Measurements
- EMC Measurements and Modeling
- Neural Networks

CALENDAR

ATTENTION READERS

Send us details of your upcoming meeting, symposium, or E3-related event, and we will be happy to include them in the Joint E3 Bulletin calendar. Send your material to Joint E3 Bulletin, c/o Ms. Mary Grieco, IITRI/ R&B, 1 Crystal Park, Suite 903, Arlington, VA 22202, (703) 486-7023, Fax (703) 486-3477, E-mail: mgrieco@iitri.org.

2000

May 30 - June 2 2000
EUROEM 2000
Scotland, UK
Information, Concorde Services Ltd,
Suite 325, Pentagon business Center,
Washington Street, Glasglow G3
BAZ Scotland, UK
Tel:: +44 (0)141-221-5411
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E-mail: euroem@concorde-uk.com

June 6 - 9 2000
2000 NATIONAL OPSEC CONFERENCE & EXHIBITION
Monterey, California
Hyatt Regency Monterey
Naval Post Graduate School
POC: McNeil Technologies, Inc.
Tel: (410) 553-6465 (voice)
Fax: (410) 553-9275
E-Mail: opsecconf@mcneiltechmd.com

June 27- 30 2000
15th International Wroclaw Symposium and Exhibition on Electromagnetic Compatibility
EMC Symposium and Exhibition
Box 2141, 51645 Wroclaw 12
Poland
POC: Prof. W. Majewski
Fax: +48713728878 or +48713729375
E-Mail: emc@il.wroc.pl

August 21- 25 2000
2000 IEEE EMC SYMPOSIUM
Washington, DC
Registration: Ms. Nathalie Gallet
Tel.: (301) 937-8888
Fax: (301) 937-2796
E-mail: ara@ara-inc.com

October 16 -20 2000
NAVAL SURFACE WARFARE CENTER
Reverberation Chamber Short Course
Dahlgren, VA 22448
POC: Mr. Mike Hatfield
Tel.: (540) 653-3451
E-mail: hatfieldmo@nswc.navy.mil

October 15 - 19 2000
INTERNATIONAL POWER ELECTRONICS CONGRESS - CIEP 2000
Hotel Hyatt Regency, Acapulco, Mexico
Interior Internado Palmira s/n,
Apdo 5-164, Cuernavaca 62050
POC: Jaime Arau Roffiel
Tel.: +52 73 18 77 41
Fax: +52 73 12 24 34
E-mail: j.arau@ieee.org and/or
jarau@cenidet.edu.mx

October 29 - November 3 2000
FIRST AUSTRALASIAN CONFERENCE ON BIO-ELECTROMAGNETICS (EMB)
Convention Center,
Christchurch, New Zealand
POC: Mr. William Wisecup
7519 Ridge Rd,
Frederick, MD 21702-3519
Tel.: (301) 663-4254
Fax: (301) 371-8955

November 6 - 8 2000
CONFERENCE ON ANTENNAS AND PROPAGATION FOR WIRELESS COMMUNICATIONS
Westin Hotel, Waltham, Mass.
Spike Technologies Inc.
POC: Naftali (Tuli) Herscovici,
1 Chestnut St. Nashua NH 03060
Tel.: (603) 594-8856
Fax: (603) 577-9647

2001

February 20 - 22 2001
2001 14TH INTERNATIONAL ZURICH SYMPOSIUM & EXHIBITION ON ELECTROMAGNETIC COMPATIBILITY
Secretariat, IKT, Eth Zentrum
CH-8092 Zurich
Switzerland
Phone: +41 1 632 2788

August 13-17 2001
ICOLSE 2001 CALL FOR PAPERS
SAE International Conference on Lightning and Static Electricty
400 Commonwealth Dr.
Warrendale, PA
POC: Jim Brahney
Fax: (724) 776-1830

August 13-17 2001
2001 IEEE INTERNATIONAL Symposium on Electromagnetic Compatibility
Palais Des Congress
Montreal, Canada
POC: Mr. Benoit Nadeau
1055 Boul St. Regis
Dorual, Quebec, H9P 2TE Canada
Phone: +1 514 822 6000
Fax: +1 514 822 6275
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Joint E3 Bulletin Material Wanted

The Joint E3 Bulletin covers events and information of interest to the DoD E3 community. This material includes technical articles, features on EMC personnel, training schedules and free courses available to DoD personnel, announcements of EMC standards activities, notes and full text articles on related policy, and much more.

Articles and other relevant E3 material are now being solicited for publication in the Joint E3 Bulletin. The articles may be as described above or may be in other forms, such as descriptions of problems, requests for technical data or information, interesting observations of E3 phenomena, E3 events announcements, or related material of interest. All submitted material must be unclassified and unrestricted. Material should be sent to Ms. Mary Grieco, IITRI/R&B, 1 Crystal Park, Suite 903, Arlington, VA 22202. (703) 486-7023. Fax (703) 486-3477. E-mail: mgrieco@iitri.org.